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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/807,541	03/23/2004	Masakuni Shiozawa	9319S-000712	3766
27572	7590	02/01/2005	EXAMINER	
HARNESS, DICKEY & PIERCE, P.L.C. P.O. BOX 828 BLOOMFIELD HILLS, MI 48303			CHU, CHRIS C	
			ART UNIT	PAPER NUMBER
			2815	

DATE MAILED: 02/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

H/A

Office Action Summary

Application No.

10/807,541

Applicant(s)

SHIOZAWA ET AL.

Examiner

Chris C. Chu

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 December 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 - 22 is/are pending in the application.
- 4a) Of the above claim(s) 3 - 5, 11 - 15 and 18 - 22 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 2, 6 - 10, 16 and 17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>3/23/04 & 7/29/04</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION***Election/Restrictions***

1. Applicant's election with traverse of Group I and Species I in the reply filed on December 20, 2004 is acknowledged. The traversal is on the ground(s) that all of the groups and species are drawn to subject matter which are so related to each other that an undue burden would not be placed upon the Examiner by maintaining all claims in a single application. This is not found persuasive because the method claims of the instant invention, especially, claim 15 recites the following sentence, "melting the solder balls to bond the solder balls to the lands by executing a reflow process while making the resin contained in the flux crawl up along surfaces of the solder balls". This requires a search in specific subclasses of class 438. However, the device claims have no such limitation, which requires no such search. Furthermore, the mutually exclusive characteristics of the respective species provide a prima facie showing of an undue search burden. However, if applicant states for the record that the apparatus claims and method claims are not patentably distinct, then the restriction requirement will be withdrawn.

Applicant elected the Group I and Species I (claims 1, 2, 6 – 10, 16 and 17) and thus claims 1, 2, 6 – 10, 16 and 17 are herein examined. The requirement is still deemed proper and is therefore made FINAL.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

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A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1, 2, 6, 8 – 10, 16 and 17 are rejected under 35 U.S.C. 102(e) as being anticipated by Nishimura et al. (U. S. Pat. No. 6,781,241).

Regarding claim 1, Nishimura et al. discloses in e.g., Fig. 11 and column 10, lines 57 – 63 a semiconductor device, comprising:

- a first semiconductor package (the package on the element 1b) having a first semiconductor chip (3b) mounted therein;
- a second semiconductor package (the package on the element 1a) having a second semiconductor chip (3c) mounted therein;
- a protruding electrode bonding (7) the first semiconductor package to the second semiconductor package so that the second semiconductor package is held above the first semiconductor chip (see Fig. 11); and
- resin (16; column 10, lines 57 – 63) provided between the first semiconductor package and the second semiconductor package, at least a part of a surface of the first semiconductor chip being spaced apart from the resin (see Fig. 11).

Regarding claim 2, Nishimura et al. discloses in e.g., Fig. 11 the protruding electrode (7) comprising a solder ball (column 10, line 58).

Regarding claim 6, Nishimura et al. discloses in e.g., Fig. 11 the resin (16) being arranged so as to contact a periphery of the protruding electrode (7 and see Fig. 11).

Regarding claim 8, Nishimura et al. discloses in e.g., Fig. 11

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- the first semiconductor package (the package on the element 1b) comprises:
 - a first carrier substrate (1b); and
 - the first semiconductor chip (3b) which is flip-chip mounted on the first carrier substrate (see Fig. 11 and column 5, lines 34 – 35); and
- the second semiconductor package (the package on the element 1a) comprises:
 - a second carrier substrate (1a) mounted on the first carrier substrate (1b) through the protruding electrode (7) so as to be held above the first semiconductor chip (3b);
 - the second semiconductor chip (3c; column 7, lines 8 – 9) which is mounted on the second carrier substrate; and
 - a sealing agent (2; column 9, line 33) that seals the second semiconductor chip (see Fig. 11).

Regarding claim 9, Nishimura et al. discloses in e.g., Fig. 11 the first semiconductor package (the package on the element 1b) comprising a ball grid array (7A) where the first semiconductor chip (3b) is flip-chip mounted on the first carrier substrate (1b), and the second semiconductor package (the package on the element 1a) comprising one of a ball grid array (7) and a chip-size package where the second semiconductor chip (3c) mounted on the second carrier substrate (1a) is mold-sealed (2; see Fig. 11).

Regarding claim 10, Nishimura et al. discloses in e.g., Fig. 11 and column 10, lines 57 – 63 an electronic device, comprising:

- a first package (the package on the element 1b) having a first electronic component (3b) mounted therein;

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- a second package (the package on the element 1a) having a second electrode component (3c) is mounted therein;
- a protruding electrode (7) bonding the first package and the second package so that the second package is held above the first electronic component (see Fig. 11); and
- resin (16) provided between the first package and the second package, at least a part of a surface of the first electronic component being spaced apart from the resin (see Fig. 11).

Regarding claim 16, Nishimura et al. discloses in e.g., Fig. 11 and column 10, lines 57 – 63 a semiconductor device, comprising:

- a first semiconductor package (the package on the element 1b) including a semiconductor chip (3b);
- a protruding electrode (7) bonded to the first semiconductor package;
- a second semiconductor package (the package on the element 1a) bonded to the protruding electrode opposite the first semiconductor package, the second semiconductor package being held above the semiconductor chip and defining a gap between the second semiconductor package and the first semiconductor package (see Fig. 11); and
- resin (16) spanning between the first semiconductor package and the second semiconductor package, the resin being laterally spaced apart from the semiconductor chip so that at least a part of the gap is free of the resin (see Fig. 11).

Regarding claim 17, Nishimura et al. discloses in e.g., Fig. 11 the resin (16) surrounding a periphery of the protruding electrode (see Fig. 11).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nishimura et al. in view of Sakuyama et al. (U. S. Pat. No. 6,670,264).

While Nishimura et al. teaches the use of the resin material, Nishimura et al. does not appear to provide the resin material's specific composition including flux. Sakuyama et al. teaches in column 2, lines 54 – 63 a resin material including flux (column 2, line 56). It would have been obvious to one of ordinary skill in the art at the time when the invention was made to include the flux as the specific material to form the resin material of Nishimura et al. as taught by Sakuyama et al. for the purpose of simplifying the bonding process (column 2, lines 54 – 55).

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Halahan, Akram et al. (U.S. Pat. No. 6,493,229 and U.S. Pat. No. 6,051,878), McCormick, Takahashi et al., Call et al. disclose a stacked semiconductor package. Furthermore, Prigmore discloses a flux type resin that is coated on solder balls.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chris C. Chu whose telephone number is 571-272-1724. The examiner can normally be reached on 11:30 - 8:00.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 517-272-1664. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>.

Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Chris C. Chu
Examiner
Art Unit 2815

C.C.
Wednesday, January 19, 2005


GEORGE ECKERT
PRIMARY EXAMINER